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ABSTRACT

Seven sample age subgroups were selected from official score reports from the College Level Examination Program (CLEP) to determine age cohort performance on the CLEP English Composition examination. The 154 CLEP English Composition score reports received by the Community College of Allegheny County (Pennsylvania) between July 1983 and June 1985 were evaluated. The age ranges included 18-21, 22-24, 25-29, 30-34, 35-39, 40-44, and 45-58 years. It was hypothesized that the accumulation of adult experiences includes opportunities to practice and master analytical writing skills to the extent that age cohorts' scores on the CLEP are significantly different. The study was undertaken in an attempt to assess one type of student outcome on a national credit-by-examination program and its application to adult education. A one-way analysis of variance design was used to accommodate testing of multiple independent group means and effects of a single treatment variable. Results indicate no statistically significant difference among the seven subgroup mean scores on the CLEP English Composition examination. It appears that the complexity of focusing on life experience as a factor in score variance may have unidentified consequences on study results. (TJH)

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Age Cohort Performance On The College-Level Examination Program (CLEP) General Examination in English Composition

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Submitted to Dr. John Weidman
in fulfillment of the requirements for
Directed Study: ADM PS 351 (Fall term 1987)

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Age Cohort Performance on the College-Level Examination Program (CLEP) General Examination in English Composition

Introduction

In 1967, the College Entrance Examination Board (CEEB) developed the College-Level Examination Program (CLEP) as a national system of credit-by-examination that enables adults to gain college credit for knowledge acquired through study outside formal classrooms. Two categories of the examination exist: General Examinations that cover materials taught in college courses during the first two years, and Subject Examinations that cover material taught in specific college courses beyond the first two years. English Composition, Humanities, Mathematics, Natural Sciences, and Social Sciences/History are the five General Examinations corresponding to broad areas of study within each of those disciplines. Subject Examinations are available in 30 specific knowledge and skill areas ranging from American Government, Human Growth and Development, and foreign languages through Calculus, General Chemistry, and Introductory Accounting to Computers and Data Processing, Analysis and Interpretation of Literature, and Eductional Psycholology. An underlying program belief is "that what a person knows is more important than how he or she came to know it" (Educational Testing Services, 1984, p. 7). CLEP examinations are methods of accrediting that knowledge.

CLEP is administered by the Educational Testing Service (ETS) which provides test data to approximately 1200 colleges

and universities. Although Test Development Committees, employing faculty with expertise in disciplines being tested, and the Commission on Educational Credit and Credentials of the American Council on Education (ACE) recommend test cutoff scores, higher education institutions are urged to review the tests to ensure that test content approximates course content, and that specific CLEP examinations are appropriate for the levels and amounts of credit awarded. Key to successful incorporation of CLEP as a credit-by-examination policy is the program's flexibility in implementation. It is important to recognize that individual colleges and universities set their own standard in recognizing the merits of CLEP tests because undergraduate education varies by institutions, and an institution's reputation is at stake in the awarding of college credit for out-of-class acquired knowledge.

The Community College of Allegheny (CCAC) has participated in CLEP since 1976. The primary reason includes recruitment and retention of returning adult students. The College uses CLEP as a recruitment strategy because its student population is inclusive, ranging from recent high school graduates to leisure learners pursuing noncredit education. Underlying the program's implementation is the belief that adults bring prior learned skills and knowledge to the formal classroom, and that that knowledge may represent the kinds of

knowledge and skills imparted during the first two years of CCAC's undergraduate education.

A boost to CLEP's popularity at CCAC is the requirement that academic degree programs include English Composition 1 and 2. The College awards 6 credits toward this requirement on the basis of successful completion of the CLEP General Examination in English Composition (hereafter, CLEP English Composition). Credit is awarded for scores at or above the 39th percentile. The majority of CCAC credits awarded for CLEP, including subject examinations, are for English Composition. Additionally, the College permits CLEP testing at any stage of a student's matriculation. Students from all age ranges may challenge English Composition 1 and 2 requirements via CLEP English Composition. The College has implemented a CLEP policy that is flexible in its requirements, and attracts a large number of adult students seeking college credit by examination.

The CLEP English Composition's popularity among all age ranges of CCAC students inspires the investigation of how differently age cohorts perform on the examination. The investigation is exceptionally pertinent in CCAC's adult education context because the College has no age limit on examination requirements, and tends to treat all age cohorts the same in terms of awarding college credit. There are no specific inspections or recognitions of knowledge that may have been differentially acquired, and all students who achieve minimum CLEP English Composition scores are awarded equal amounts of college credit in that discipline.

Statement of the Problem

Do age cohorts score significantly different on CLEP English Composition examinations? Specifically, answers to these questions are sought:

(1) Do mean scores vary significantly by age cohorts?

(2) Do age cohorts perform equally on the examination?

The CLEP General Examination in English Composition is designed to measure analytic writing skills required in most first-year college composition courses which recent high school graduates may not have mastered, and broad life experiences of adults less recently affiliated with secondary schools may have included more opportunities in mastery of analytic writing skills that the examination is designed to measure. The results expected from this study are that age cohorts score significantly different on the examination based on the preceeding assumptions.

Theoretical Framework

The theoretical basis of this study is that education does not cease when a person leaves the confines of formal schooling, but that education is an accumulation of knowledge and skills acquired through human experiences. American philosopher

John Dewey is credited with the introduction of the progressive educational ideals that included belief in a more broad definition of education that encompasses pragmatic and utilitarian aspects of education. This broadened view of education is that:

> it [education] is not restricted to schooling, but includes all those incidental and intentional activities that society uses to pass on values, attitudes, knowledge, and skills (Elias and Merriam, 1984, p. 55).

John Dewey (cited in Elias and Merriam, 1984) argued for education that was truly lifelong, a "continuous growth of the mind . . . . Real education comes after we leave school and there is no reson why it should stop before death" (p. 55).

Hofstadter, Miller, and Aaron (1960) describe America's Progressive Era, turn-of-the-century years 1890 through 1920, as an age dominated by a passion for social progress and reforms in politics, business, and morals (p. 575). It is John Dewey's writings and teaching that urge the need to improve the quality of community life by expanding the role of public school systems to include education for a democratic society. "Dewey believed in the intelligence as a tool for social reform...[and that] education should be intimately related to the rest of life" (p. 536). Although Dewey's early teachings focused on a more child-centered

education that sought total development of a child's potential, it is within the third phase of the progressive education movement, that of experimentalism - "activity pedagogy undertaken to learn truth by testing it, to acquire [knowledge] by inquiry" (Brubacher, 1966, p. 230), - that the seeds of adult education of the 1960's and 1970's may be found.

Review of Related Literature

Pragmatism, a philosophical view that stresses practicality in determining meaning (Urdang and Flexner, 1968, p. 1041), was the basis of progressive educational thought. The belief that human experience was educative and worthy of inclusion in assessment of what has been learned introduced a new perspective in which education of adults came to be viewed. Knowles (cited in Elias and Merriam, 1984) explains that in the period between 1866 and 1920, "the useful, functional pragmatic became the predominant standards for knowledge and science" (p. 52). Colleges and universities began to acknowledge the fact that education and learning was not restricted to formal classrooms, but occured through individual experiences and adjustment to the world. These varied educative experiences correspond to progressives' emphasis on "the centrality of experience...[the belief that] the learners' experiences were an equally valid center for education" (p. 56). Knowles (1980)

emphasizes the importance of the role of experience in adult education practices. The differences between the life experiences of children and of adults are such that implications for practice emphasize experiential techniques that "tap the experience" of the adult learners...a distinct shift in emphasis...way from the transmittal techniques so prevalent in youth education...toward the more participatory experiential techniques (p. 50).

The impact of the progressive education movement on development of adult education programs was not as profound during Dewey's years of proselytizing an expanded role for public education, but becomes evident in the resurgence of his ideas during the social, political, and economic changes that accompanied World War II. American higher education was faced with returning military personnel and ways of crediting past self education. Knowles (1962) explains that "a uniquely adult curriculum" was created as a result of grappling with the problems of accrediting general education (p. 85). Significant to this study is Stern's (cited in Knowles, 1962) assertion that higher education's "endeavors in the first concern centered around inventing equivalency measures for equating experiential learnings with course credits" (p. 85). This point is key to this investigation because CLEP General Examinations are intended to accredit experiential learning. The centrality of experience conceptual framework guides this study.

The College-Level Examination Program as a vehicle of adult education evolved from the need to certify knowledge at secondary and postsecondary levels. The Comprehensive College Testing (CCT) is the forerunner of today's CLEP. The American Council on Education's Commission on Accreditiation of Service Experiences, in 1945, developed three instruments that accomplished those goals: General Education Development (GED), United States Armed Forces Institute (USAFI), and Comprehensive College Testing (Kreplin, 1971, p. 25). Ironically, although one of CLEP's intents is acceleration by accreditation of prior learning, American higher education's focus was enrichment rather than acceleration. Credit-by-examination was not the popular CLEP adult education tool used today, but was practiced through honors and independent study programs as a methods of enrichment (p. 6).

Checketts and Christensen (1974) studied the validity of Utah State University practices of awarding college credit in Freshmen English at Utah State University based on CLEP English Composition scores. Their research employed analysis of variance design that showed the CLEP credited subgroup scored very much like the Freshmen English subgroup of A and B students (p. 359). Further, multiple regression analysis using Freshmen English grade point averages as criteria of writing skills found that the objective version of the CLEP Subject Examination in English Composition was a more valid predictor of writing skills than the essay version of the same examination (p. 360).

Relative levels of performance on the five CLEP General Examinations change with age, and as grade level completed by 43,877 military personnel increased so did the mean scores on the examinations (Sharon's 1971a, p. 234, 235). The mean scores on humanities and social science tests progressively rose by age cohorts, and an overall decline with age in the mean scores on mathematics and natural sciences tests was found. Scores on the English Composition test [were] consistently the lowest of the five tests at every age level (p. 236).

Regarding correlations between CLEP test scores and grades in areas represented by the tests, it was found that English Composition scores were highly correlated with quality points earned, and grade point average in English Composition, $R = .45$ and $R = .41$, respectively (Cashin, 1974, p. 910). Correlation analysis also revealed that CLEP English Composition correlated positively with grade measures in literature, but negatively with grade measures in mathematics (p. 910).

Several research studies (Caldwell, 1977; Enger and Whitney, 1974; Legg and Webb, 1977; Losak, 1979; Losak and Lin, 1973; Meenihan, 1976; Wermers, 1972) were concerned with CLEP-credited student academic performance in subsequent college courses, and comparison with similar students who had not been granted CLEP credit. Caldwell (1977) found that even though CLEP students enrolled for advanced courses to about the same extent as non-CLEP students, CLEP students achieved higher

average grades in each of the five test areas than did the non-CLEP students (p. 401). Academic advancement toward Associate degrees was significantly faster for Losak's (1977) community college CLEP students who also entered the Florida State University system at a higher rate than did non-CLEP students (p. 26). Losak and Lin (1973) compared academic achievement in advanced courses, with results that show no significant differences in mean grade averages in the five academic areas corresponding to CLEP test of Miami-Dade Junior College CLEP students and non-CLEP students (p. 130).

Legg and Webb (1977) discovered that as CLEP scores increase beyond the 50th percentile, the number of students achieving the higher scores decreased in English Composition, humanities, and social sciences (p. 12). Further comparisons revealed no significant differences in grade-point-averages over a three year period (1972-1975) between University of Florida undergraduate CLEP and non-CLEP subgroups (p. 7). A cross comparison of junior college transfers', four-year college transfers', and University of Illinois at Urbana - Champaign native students' CLEP scores showed that regarding English Composition no significant difference of mean scores when high school percentile rank, academic achievement composite score (ACT-C), socioeconomic statuses, and semester hours completed in English Composition were covaried (Wermers, 1972, p. 21). Enger and Whitney's (1974) analyses of CLEP credit as a means to

shorten the time required for graduation at the University of Iowa further underscores the importance of the impact of past academic achievement on later matriculation outcomes. CLEP students accumulated more semester hours with higher grade point averages, graduated earlier, and at a higher rate than non-CLEP students (p. 238 - 239). The researchers caution readers about study results due to the better academic credentials of CLEP-credited students upon admittance to the University of Iowa (p. 239).

Meenihan (1976) compares University of Pittsburgh School of General Studies CLEP and non-CLEP graduates on differences in 8 areas: age, sex, high school graduation percentile rank, average number of credits carried by term, type of academic major, overall course grade point averages, major grade point averages, and non-major course grade point averages. Significant differences existed between the subgroups on the grade-point-average variable. CLEP graduates' overall course major, and non-major GPAs were significantly higher than non-CLEP graduates (p. 70). Correlation analysis to determine the extent of any relationship that existed between the number of CLEP credits awarded and age revealed the lowest correlation coefficient was for womens' ages (R = .02),(p. 87).

The preceding review of related literature is intended to provide theoretical and research contexts for the problem under investigation: Do age cohorts score significantly

different on the CLEP English Composition examination? The theoretical basis of this investigation centers on the progressive educational idea of centrality of experience as a viable factor in education. CLEP as a credit-by-examination process has been explained as it relates to higher education's responses to the need for certification of experiential learning of World War II veterans. Research studies that measure academic achievement, correlations between age and test performances, and variances between subgroup CLEP mean scores have been included to provide research backgrounds.

Statement of the Hypothesis

The problem under investigation arises from the hypothesis that the accumulation of adult experiences includes opportunities to practice and master analytic writing skills to the extent that age cohorts score significantly different on the CLEP English Compositon examination.

CLEP English Composition mean scores of seven independent age subgroups are measured. The one-way analysis of variance (ANOVA) design is employed to answer the question: Is there an overall effect of age on the CLEP English Composition mean scores of the 7 subgroups? The study's primary question concerns differential performance by age cohorts on the examination.

Inherent with this hypothesis is the assumption that as adults accumulate life experiences, they are afforded opportunities in continued study and practice to the extent that their analytic writing skills improve over time.

Definitions

Definitions of terms and expressions used throughout this study are provided for clarification and consistency purposes. As previously noted, acronyms are used for College-Level Examination Program (CLEP), Community College of Allegheny County (CCAC), College Entrance Examination Board (CEEB), and Educational Testing Service (ETS). Because this study involves terms that may be interpreted differently by different persons, the following definitions of terms used in this study follow:

age cohorts - A grouping of student scores by age ranges. The age ranges for this study correspond to those categories used by the U.S. Census Bureau in reporting population statisics. Seven age cohorts are measured.

adult education - "a process whereby persons whose major social roles are characteristic of adult status undertake systematic and sustained learning activities for the purpose of bringing about changes in knowledge, attitudes, values, and skills" (Darkenwald and Merriam, 1982, p. 9).

CLEP English Composition - the 90 minute all-multiple-choice form of the General Education series of CLEP tests that report standard scores on a scale ranging from 200 to 800, with a mean of 500 and standard deviation of 100; the reference group for the 1978 English examination form under investigation was normed on the perforamnce of 2,290 students completing first-year English courses in spring 1978 at 37 colleges and universities across the U.S. It measures the writing skills needed for college assignments, and in particular for writing that explains, interprets, analyzes, or presents and supports a point of view. Reliability estimates were computed by Kuder-Richardson Formula 20 (KR-20), and estimated as .92. The test is speeded to the extent that performance on it is determined by the number of questions candidates have time to answer (College Board, 1984, 1-11).

credit-by-examination - programs that emphasize certification of knowledge acquired outside formal college classrooms through the award of college credit.

Delimitations and Limitations

This study concerns age cohort performance on only the CLEP English Composition examination due to the nature of the population. CCAC students submitted CLEP General Examination scores in all 5 General Examinations between July 1983 and June 1985. Seventy-three percent of those scores (270) were for English Composition.

Prior backgrounds concerning past academic achievements, socioeconomic statuses, and motivations of students included in the study are not statistically controlled, nor addressed. It is recognized that prior

knowledge, experiences, race, sex, and other unaccounted for variables may influence test performance. However, those issues are not addressed in the study. CLEP students' academic achievement in CCAC certificate and degree programs, graduation rates, and other measures related to matriculation are not within the study's scope. It is assumed that those CCAC students with interest in gaining credit-by-examination via CLEP during the considered time period are represented in the samples randomly drawn from the population of 270 English Composition standard scores.

Student outcomes from this study are limited to the population under consideration. The analysis of variance (ANOVA) research design employed measures an overall effect of age on examination results, and is not intended to investigate specific hypotheses about subgroup performances. The subgroups under investigation may not be representative of all age cohorts that complete CLEP English Composition examinations, effectively limiting the study's outcomes to the population investigated.

Significance of the Study

The opportunity to assess one type of student outcome on a national credit-by-examination program and its application to adult education, and discovery of new knowledge as a

contribution to existing CLEP databases that measure different aspects of student performances underlie this investigation.

Sharon (1971b) captures the essense of resistance to credit-by-examination by pointing to the agruement that:

> learning independently or in a nontraditional manner cannot be as good as learning in the classroom. College life provides certain experiences other than formal learning by which students learn important values not readily measured by an examination (p. 12).

Arguments that encourage credit-by-examination practices focus attention on individual student differences and the need to certify knowledge of the most able students, and the diagnostic potential of credit-by-examination programs in providing a reference point for academic advising and curriculum development (Hendricks, 1960, p. 214; Gainsley, 1971, p. 10).

Discovery of new knowledge about age cohort test performance in a community college context is intended to further enrich credit-by-examination databases used in academic decisionmaking about acceleration programs and adult continuing education. Significantly, this study is the first to measure student outcomes on CLEP General Examinations using CCAC student databases. Although the College has awarded credit for CLEP examinations over the past twelve years, no comprehensive research has been conducted that assesses student

performances, and outcomes of its credit-by-examination practices. Through assessment of age cohort performnce on the CLEP English Composition examination, the research is conducted as a backdrop to debates about credit-by-examination programs that seek new ways of certifying knowledge.

Methodology

Sample

The seven sample subgroups for this study were selected from official score reports issued monthly by the ETS to the CCAC administrator responsible for score evaluation. The official score report provides a candidate's name and social security number, date of birth, month and year in which the CLEP English Composition examination was taken, and the candidate's standard score. Between July 1983 and June 1985, CCAC received 270 CLEP English Composition score reports for credit-by-examination evaluation.

Each candidate's age, at the time of examination, was calculated by subtracting date of birth from examination date. Ages ranged from 18 through 58 years.

Seven age ranges were determined based on U.S. Census Bureau categories used in reporting population statistics. The

7 ranges, number of scores per range, and subgroup numbers follow:

Age Range	No. of Scores	Subgroup No.
18 - 21	23	1
22 - 24	22	2
25 - 29	53	3
30 - 34	66	4
35 - 39	46	5
40 - 44	22	6
45 - 58	38	7

Using a table of random numbers, 22 scores were randomly selected for subgroups 1, 3, 4, 5, and 7. A total of 154 scores were measured in this study.

The scores used in this study were randomly drawn from the entire population of English Composition scores submitted to CCAC. Official score reports used in selections gave no indication of college credits awarded, if any. Percentile ranks are not provided by the ETS for CLEP English Composition.

The ETS permits candidate's to retest after a six month period. CCAC students who submitted more than one CLEP English Composition score report during the 24 month period of this study were not deleted, but treated as different score recipients.

Design

The one-way analysis of variance (ANOVA) design is used because it accommodates testing of multiple independent group means, and effects of a single treatment variable. The data meet ANOVA requirements of homogeneity of variance for within-group variances, and random, independent sampling.

Procedure

Statistics were calculated for among-group variance, within-group variance, total variance, and mean squares by equivalent raw-score formulas (Glasnapp and Poggio, 1985, p. 452-486).

$$SS_B = \sum_j n_j(\bar{X}_j - \bar{G})^2$$

$$= \sum_j \frac{(\Sigma X_j)^2}{n_j} - \frac{(\Sigma X_{..})^2}{N}$$

where ΣX_j = sum of the scores for each subgroup

n_j = sample size for each subgroup

$\Sigma X_{..}$ = total sum of all scores in the design

N = total number of scores in the design

Calculation of SS_B:

$SS_B = (11912)^2/22 + (12717)^2/22 + (12665)^2/22 + (12527)^2/22 +$
$(13483)^2/22 + (12011)^2/22 + (12831)^2/22 - (88146)^2/154$

$= 50528898 - 50452710$

$= 76188$

$df_{between} = 7 - 1$

$= 6$

$$SS_W = \sum_i \sum_j (X_{ij} - \bar{X}_j)^2$$

$$= \Sigma X_{..}^2 - \sum_j \frac{(\Sigma X_j)^2}{n_j}$$

where $\Sigma X_{..}^2$ = the sum of all squared scores in the design

Calculation of SS_W :

SS_W = 6607406 + 7585267 + 7458107 + 7376137 + 8471779 + 6772159 + 7660297 - (50528898)

= 51931152 - 50528898

= 1402254

df_{within} = 154 - 7

= 147

Calculation of SS_{Total}

$SS_T = SS_B + SS_W$

= 76188 + 1402254

= 1478442

Calculations for mean squares:

$MS_B = \frac{SS_B}{df_B}$ = 76188 / 6 = 12698

$MS_W = \frac{SS_W}{df_W}$ = 1402254 / 147 = 9539

Calculation of MS_B to MS_W for observed F value :

$F_{obs} = MS_B / MS_W$

= 12698 / 9539

= 1.33

Calculation of $F_{crit\ (6,147)}$ at p = .05

$F_{crit\ (6,147)} = 2.10$

Comparison of F_{obs} to F_{crit} : $1.33 < 2.10$

Decision: Retain the null hypothesis

$H_0 : \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = \mu_6 = \mu_7$

Reject the research hypothesis

ANOVA Summary Table

Sources of variance	df	SS	MS	F
Age Ranges (between groups)	6	76188	12698	1.33
Within groups	147	1402254	9539	
TOTAL	153	1478442		

Results

The preceeding calculations indicate no statistically significant difference between the 7 subgroup mean scores on the CLEP English Composition examination. Variability of mean scores among age cohorts is attributed to sampling error, and not to differential effects of age, the treatment variable. The between group variance estimate ($MS_B = 12698$) was not of sufficient magnitude to warrant a significant observed F-ratio at the .05 level of significance.

The seven subgroups are presumed to have performed equally on the examination, and are representative of the same theoretical population. The research hypothesis that age cohort mean scores vary significantly must be rejected based on ANOVA calculations.

Conclusions

The population from which scores were drawn may have represented the most able students, regardless of age and life experiences. These students represent a wide range of motivational variables and prior knowledge not measured in the study. Life experience as an educative factor is difficult to define and isolate for study. The complexity of focusing on that factor may have unidentified consequences on the study results. Ideally, more study of prior academic knowledge and measures of life experience, and any correlation with credit by examination, especially CLEP due to its widespread use, should be undertaken to pinpoint and predict student performance on such examinations.

The CLEP English Composition examination is designed to measure freshmen-sophomore level analytic writing skills, and are not intended as discriminatory measures of age cohort performance. The first two years of undergraduate analytic writing skill requirements may be obtainable through intensive, short-term study, and not especially demanding of adults regardless of age and life experiences. Age cohort performance on a different, more challenging examination may be required in addressing significant differences regarding that performance. Additionally, CLEP tests are designed to appeal to all categories of returning adult students, and may be intentionally constructed on a broad basis so to capture a wide range of skills. Individual exceptional differences may be lost in its scope.

The broadness of Dewey's centrality of experience conceptual framework may impede direct application to this study. Taking into consideration the framework's pragmatic and utilitarian roots, this form of credit-by-examination may have been too narrowly applied. The question arises about the extent of practical knowledge measured by the CLEP English Composition examination. Practical knowledge about the analytic skills required by the examination may not reflect the same levels of performanc by different age cohorts. More study is required to determine the parameters of the centrality of experience concept.

A replication of this study requires measures of prior knowledge, possibly inclusion of control subgroups, and an appropriate scope within which to apply the centrality of experience concept. Additionally, a more powerful analysis of variance design will contribute to more accurate measures of age cohort performance on this particular credit-by-examination program.

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